MICHAELOPUS SPINITARSIS FAIN (ACARI: ACARIDAE): A FIRST RECORD IN THE BRITISH ISLES

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Abstract. The mite *Michaelopus spinitarsis* Fain is recorded in the British Isles for the first time, collected from within the decaying branch of an apple tree in North Yorkshire. Additional measurements are given for the female. All other developmental stages are described for the first time and measurements given. Examination of the phoretic nymphal stage, or hypopus, indicates that *Michaelopus johnstoni* Fain may be synonymous with this species. The distribution and known developmental stages of the 21 nominal species are tabulated.

INTRODUCTION

On the 31.iii.1998 a large number of mites of one type were collected from within the decaying branch of an old apple tree in the village of Burythorpe in North Yorkshire (SE 793646). The internal tissues of the branch were well decayed, spongy in texture, heavily infiltrated by fungi and showing signs of previous habitation by wood-boring insects. The feeding activity of the mites had resulted in long narrow galleries being formed in the wood immediately under the bark. The older galleries were filled with mite faecal pellets and debris. These observations correspond closely with those made by Michael (1903), when referring to the feeding activities of *Histiogaster corticalis* (Michael) (*Michaelopus corticalis* (Michael)) within the leaves of *Arundo phragmites* L. When examined under the microscope, the gut contents of the mites were clearly visible, consisting of pieces of fungal hyphae mixed with fragments of substrate.

Females were identified as *Michaelopus spinitarsis*, the identification being verified by Dr Anne Baker of the Natural History Museum, London (NHM). Prior to this record *M. spinitarsis* was known only from a single female specimen collected from humus in the Forêt de Soignes, near Brussels, Belgium (Fain, 1982). This species is recorded here for the first time in the British Isles, and all the previously unknown developmental stages are described.

The genus *Michaelopus* was erected by Fain & Johnston (1974), who designated *Tyroglyphus corticalis* Michael, 1885 as the type species. One hypopus was designated as a lectotype and three others as paralectotypes from the original material deposited in the NHM. In the same paper *Michaelopus sminthurus* Fain & Johnston, 1974 was described from a single hypopus collected in England, found on the collembollan *Sminthurus fuscus* L.

The review of the genera *Michaelopus* and *Thyreophagus* Fain (1982) lists fifteen species and one subspecies of *Michaelopus*. Three, namely *M. augusta* (Banks, 1906), *M. berlesiana* (Zachvatkin, 1941) and *M. magna* (Berlese, 1910), were considered to be of uncertain status, as the reviewer was unable to examine the original material and the existing descriptions were considered insufficient. Since 1982 five new species have been described and a sixth transferred from the genus *Monjesiella* Berlese, 1897 (Klimov, 1998), thus making a total of 21 nominal species in the genus.

Distribution and ecology

Geographically the genus is widespread, being recorded from all continents with the exception of Antarctica and Australia (Table 1). Seven species have been recorded from the British Isles, collected from the following counties: *M. corticalis* from Dorset, Kent, Nottinghamshire and Warwickshire; *M. evansi* Fain from County Wexford, Republic of Ireland; *M. macfarlanei* Fain from Hertfordshire? (collected from UK wheat destined for export, origin not known); *M. sminthurus* from Nottinghamshire; *M. spinitarsis* from North Yorkshire and *M. vermicularis* (Fain & Lukoschus) from the Scilly Isles. MacQuillan (1967) records *M. berlesiana* from County Armagh in Northern Ireland, a species, as previously mentioned, that is considered to be of uncertain status (Fain, 1982). The distribution of these species is not fully known, but it is likely that they are far more widespread than the present records indicate.

Ecologically these mites have been found in a wide range of habitats; the adults have been found in decaying plant material, flowers, fungi, soil, house dust, flour, leaf litter, birds' nests and associated with a range of homopteran species. The hypopi of many species have been found attached to a number of different vertebrates and invertebrates. The known records have been comprehensively summarised by Klimov (1998).

None of the described species are at present thought to be of economic importance, although it has been demonstrated that *M. corticalis* (Michael) is capable of

Table 1. *Michaelopus* Fain & Johnston. Known life stages and geographic distribution

Species	F	M	L	P	T	H	Distribution
annae Sevastianov & Kivganov, 1992	•	•					Ukraine
africanus Mahunka, 1973						•	Ghana
athiasae Fain, 1982	•						France
corticalis (Michael, 1885)	•	•		•	•	•	United Kingdom, Belgium, Germany
evansi Fain, 1982	•	•					Republic of Ireland
gallegoi (Portus & Gomez, 1980)	•	•					Spain
subsp. *mauritianus* Fain, 1982	•						Mauritius
incanus Fain, 1987	•	•					Colombia
johnstoni Fain, 1982						•	USA
leclerqui Fain, 1982						•	Belgium
longirentinalis Klimov, 1998						•	South Korea
macfarlanei Fain, 1982	•						United Kingdom
passerinus de la Cruz, 1990	•	•	•	•			Cuba
polezhaevi (Zachvatkin, 1953)						•	Russia?
rawandus Fain, 1982						•	Rwanda
sminthurus Fain & Johnston, 1974						•	United Kingdom
spinitarsis Fain, 1982	•	*	*	*	*	*	Belgium, United Kingdom
tridens Fain, 1986		•					USA
vermicularis (Fain & Lukoschus, 1982)	•						United Kingdom (Scilly Isles)
augusta (Banks, 1906)	?	?					USA
berlesiana (Zachvatkin, 1941)	•	•					Italy
magna (Berlese, 1910)	•					•	Italy

Female (F), Male (M), Larva (L), Protonymph (P), Tritonymph (T), Hypopus (H). *Described in this paper.

dispersing virulent and sub-virulent spores of *Cryphonectria parasitica* (Murr.) Barr (Nannelli & Turchetti, 1989). This fungus induces cankers in chestnut trees.

Description

In life these mites are shiny, varying in colour from a translucent pale yellow in the juvenile stages (with the exception of the hypopus which is entirely pale yellowish brown) to a waxy-white in the adults, that have pinkish-brown appendages and apodemes (apodemes are ridges of thickened cuticle that run from the bases of the legs towards the centre of the body, and serve as sites for the attachment of muscles).

The most noticeable features of these mites are their elongate shape being up to three times longer than wide, bearing inconspicuous body setae and with the first two pairs of legs being widely separated from the second two pairs.

The width of the adults is close to that of the galleries in which they were found. This suggests that apart from their feeding activity, the overall proportions of the mites had a bearing on the way in which the galleries were formed.

M. spinitarsis was described from a single female. The specimens collected in Burythorpe allow all stages to be described and give an indication of the range of morphological variation exhibited by this species, albeit from a single population. Forty-eight specimens were mounted on nine microscope slides (6 larvae, 22 protonymphs, 1 tritonymph, 13 females, 1 male and 5 hypopi) in Heinz media. Following the convention of previous authors e.g. Fain, 1982, various structures were measured. Some of the mounted specimens were found to be orientated in such a way as to prevent accurate or complete measurements from being taken. It was however possible to measure the two largest and smallest examples of each life stage, where available, to cover the size range in the sample. All measurements are given in microns (μ).

Female: (4 specimens) Idiosoma, length 570–672, width 225–264; Dorsal shield, length 107–112, width 100–105; Setae *v1* 40–64, *sae* 62–86, *scz* 24–26, *d4* 52–56, *d5* 130–140, *l1* 56–65, *l2* 46–50, *l3* 62–84, *l5* 82–86, *a1* 58–62; Length of tarsi: I–IV 19.4–23.6; 18.0–24.3; 16.6–17.3; 16.6–18.7. Chaetotaxy: Tarsi 4:4:3:3, Tibiae 2:2:2:1, Genua 2:2:0:0, Femora 1:1:0:1, Trochanters 1:1:1:0; Solenidia, tarsus I, $\omega 1$ 16.4, $\omega 2$ 11.4, $\epsilon 3.6$, tibia I, ϕ 67.8–89.2, tibiae II, III, IV: 78.5–92.8: 82.8–91.4: 32.8–38.5 respectively, genu I $\sigma 1$ 22–22.8, and $\sigma 2$ 16.4–18.5.

Male: (1 specimen) Idiosoma, length 375, width 190; Dorsal shield length 63.3, width 53.3; Setae *v1* 30, *sce* 65, *d4* 28.3, *d5* 51.6, *l1* 45.8, *l2* 21.6, *l3* 50, *l5* 40; Adanal suckers, width 20.7, Genitalia, 18.8 × 18.8; Length of tarsi: I–IV 15; 15; 13.3; 13.3. Chaetotaxy: As for the female; Solenidia tarsus I, $\omega 1$ 10.7 cylindrical, with a bulbous, egg-shaped apex, $\omega 2$ 8.9 uniform, thin; ϵ 2.1, tibia I ϕ 53.5, solenidia on tibiae II, III 50 and 47.8 uniform, IV 3.5 conical, genu I $\sigma 1$ 23.5 and $\sigma 2$ 14.3

Larva: (4 specimens) Idiosoma, length 171–206, width 81.6–86.6; Dorsal shield, length 41.6, width 41.6–46.6; length of tarsi I–III: 9.1–10.8; 9.1–10.0; 8.3–9.1. Chaetotaxy: Tarsi 3:3:3, Tibiae 2:2:1, Genua 2:2:0, Femora 1:1:0, Trochanters 0:0:0. Coxal rods 7.8 long, 3.6 wide, uniform, ends smoothly rounded, each with two concentric furrows.

Protonymph: (4 specimens) Idiosoma, length 345–470, width 105–210; Dorsal shield, length 53–63.3, width 50–58.3; Length of tarsi I–IV: 10–13.3; 10–15; 8.3–10; 8.3–10. Chaetotaxy: Tarsi 3:3:3:3, Tibiae 2:2:1:0, Genua 2:2:0:0, Femora 1:1:0:0, Trochanters 0:0:0:0.

Tritonymph: (1 specimen) Idiosoma, length 535, width 230; Dorsal shield, length 66.6, width 68.3; Length of tarsi I–IV: 18.3; 18.3; 14.1; 14.1. Chaetotaxy: Tarsi 4:4:3:3, Tibiae 2:2:1:1, Genua 2:2:0:0, Femora 1:1:0:1, Trochanters 1:1:1:0.

Hypopus: (4 specimens) Length 230–263, width 123–171 (ratio 1:1.50–1.87); Propodosoma 83–91.6; Hysterosoma 138–175 (ratio 1:1.5–2.2); Eye separation 33–50; Eye diameter 16.6–18.3; Length of tarsi: I–IV 28–33; 25–25; 13.3–16; 13.3–16. Chaetotaxy: Tarsi 8:8:8:8, Tibiae 2:2:1:1, Genua 2:2:0:0, Femora 1:1:1:0, Trochanters 1:1:1:0. Solenidia, Tarsus I, *ω1* 20.7 long, thin, with bulbous apex, *ω2* 20.7 long, thin, uniform, *ω3* 7.1 long, thin, uniform; ϵ 2.8 long conical, sharply pointed.

Discussion

The measurements given for the holotype of *M. spinitarsis* generally fell within the ranges recorded here, with the following exceptions. In the Burythorpe population, setae *l5* are 36–43% longer, tarsi IV are 18–33% longer and the propodasomal shields are slightly larger in both dimensions. The hypopi key out as either *M. corticalis* or *M. johnstoni* Fain, although they more closely resemble *johnstoni* in overall proportions, particularly the robustness of the apodemes and in the sizes of the measured structures.

The main characters used by Fain (1982) to differentiate between the adults of six *Michaelopus* species included: the proportions and ornamentation of the propodosomal shield, shape and structure of the spermatheca, shape of setae *d5* and *l5* and the number of tarsal spines. Some measurements are also given, but it is questionable how useful these are when we consider that many species are known from a limited number of specimens, e.g. *M. spinitarsis* was described from a single female. There is therefore no measure of the range of variability. In the same paper a key is provided to the hypopal stages of six species of *Michaelopus*, that is even more reliant on measurements than the adult key, but which is also based on the examination of a limited number of specimens. Ideally, and when possible, a range of specimens should be examined and measured when a species is described in order to take account of any variability.

The females collected in Burythorpe are clearly *M. spinitarsis* whilst the hypopi more closely resemble *M. johnstoni*. It appears from this evidence that the two species are synonymous, but further specimens need to be studied to confirm this. If synonymy were to be proven the name *spinitarsis* should be adopted as this has page precedence. In future other cases of synonymy may be found, as there are at present ten species of *Michaelopus* known solely from a single developmental stage (three from adults and seven from the hypopi). Five slides consisting of 18 specimens are deposited at the CSL, and four slides consisting of thirty specimens, including the single male and tritonymph, are deposited in the collection of the NHM, London.

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SHORT COMMUNICATION

Grass-mowing machinery, an important cause of stag beetle mortality in a south London park.—Those of us living in south-east London are fortunate enough to find stag beetles, *Lucanus cervus* L. (Coleoptera: Lucanidae), regularly most years. Here, this supposedly nationally scarce species (notable B, Hyman & Parsons, 1992) is common and widespread, in parks, gardens, woods and verges. It is often noticed by non-entomological friends and neighbours who, awed by the male's wondrous antlers, are concerned to seek expert advice on its potential pest status or desperate assistance against what they fear may be a dangerous animal.

The beetle's distribution was recently the subject of the "great stag hunt", a nationwide survey drawing on records from the general public as well as from entomologists (Anon, 1999; Napier, 1999; Frith, 1999). Apart from live specimens found crawling on logs and tree trunks or seen flying in early evening and the larvae found under logs, the clearly recognizable remains of dead specimens are often discovered; these remains in particular demonstrate just how widespread this magnificent creature is in the area.

Occasionally more-or-less complete dead specimens are found, of either sex, some apparently without injury and some, the victims of cars and lorries, completely crushed on roads, but more usually odd broken parts are seen. Typical